# Interface Definition

## RISH EM DC 6000



# DIGITAL MULTIFUNCTION INSTRUMENT

## Programmable Multi-function DC Energy Meter

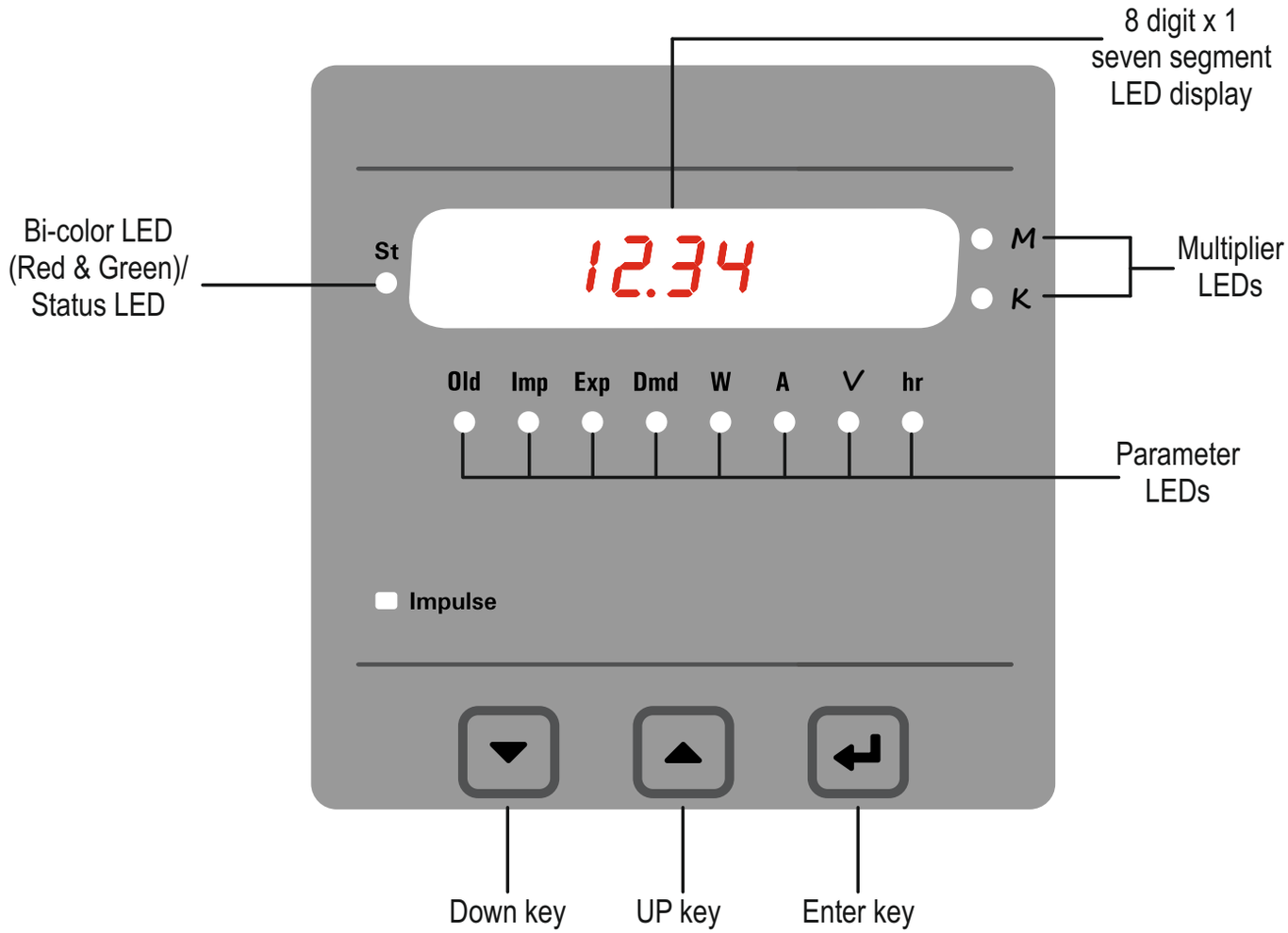
## Installation & Operating Instructions


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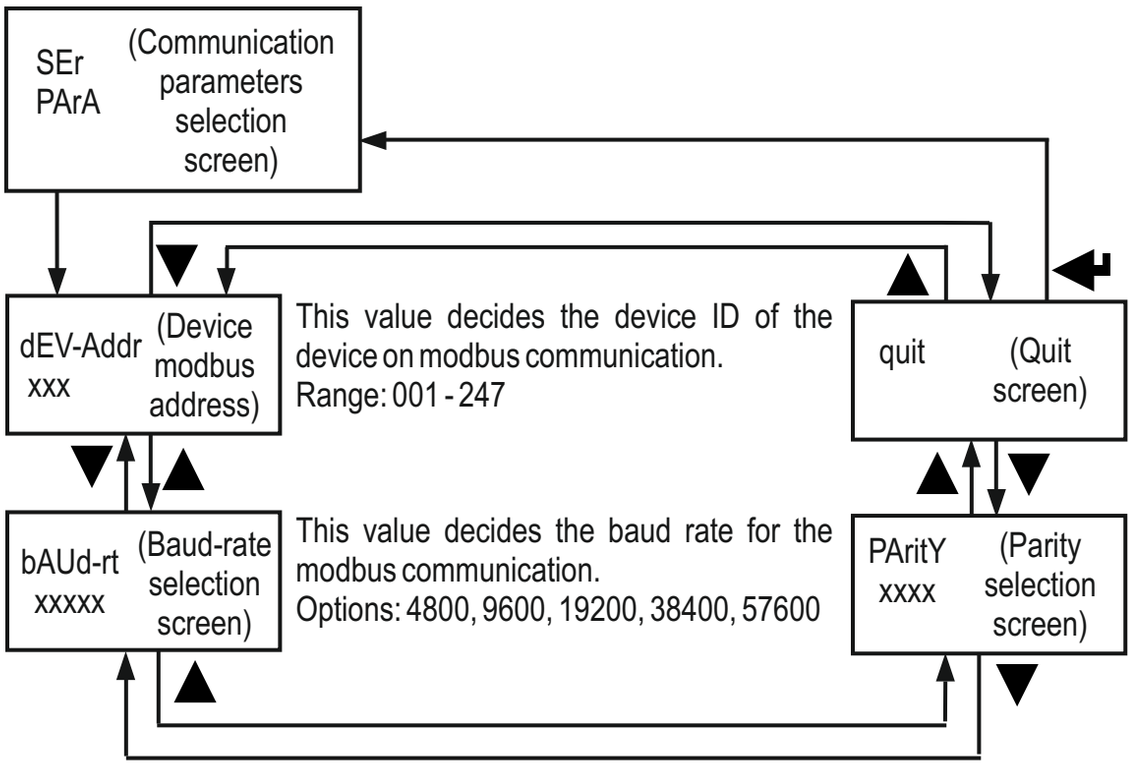
# 1. Introduction

The Multifunction DC Energy Meter is a panel mounted 96 x 96mm DIN Quadratic Digital Panel Meter, which measures important electrical parameters in DC Network and replaces the multiple analog panel meters. It measures electrical parameters like DC voltage, Current, Power, Energy (Import & Export), Demand & many more. It integrates accurate measurement technology with bright LED display (8 digit x 1). The meter can be configured on site for various parameters including Nominal Voltage, Current Full Scale, Current Shunt, Demand Integration, Time etc. The front panel has three push buttons using which the user can scroll through different screens & configure the product. It also includes 12 LEDs which in conjunction with LED display, provides information in different units and gives overview of system status.




Operation via standard RS485 is also possible. Through this optional interface all the above mentioned parameters can be configured and programmed. For modbus service, it is essential that device address, baud rate and parity should be configured properly. This document specifies only the interface between a Master device and Energy Meter for electrical variable through MODBUS over RS485.

## 2. Communication Parameter Selection Screen




The parameter values set here are only applicable for modbus communication.
While using the USB port on the meter these values are as following and non-editable.
Device address: 1
Baud Rate: 57600
Parity: No
Stop bits: 1

### Parameter Editing Guide
### Use these points to change any value in setup screens.

1) Use ↵ key to enter editing mode. A blinking decimal point will be displayed as cursor.
2) Use ▲ & ▼ keys to increase or decrease the digit values respectively, or cycle through options.
3) Use ↵ key to go to the next cursor position.
4) Use ↵ key to confirm the value and finish editing.
5) Longpress ▲ & ▼ together to go to the previous menu.
   The same can be achieved by going to quit screen and pressing ↵ key.
6) If user inputs values out of the limits specified, they are brought to the limit values automatically by the meter and showed at value confirmation.
7) Number of 'x's denote displayed digits on the screen which the user can edit.

## 3. RS 485 ( ModBus ) Output :

The Multifunction DC Energy Meter Supports MODBUS (RS485) RTU protocol ( 2-wire ).
Connection should be made using twisted pair shielded cable. All "A" and "B" connections are daisy chained together. The screens should also be connected to the “Gnd” terminal. To avoid the possibility of loop currents, an Earth connection should be made at one point on the network. Loop (ring) topology does not require any termination load. Line topology may or may not require terminating loads depending on the type and length of cable used. The impedance of the termination load should match the impedance of the cable and be at both ends of the line. The cable should be terminated at each end with a 120 ohm (1/4 Watt min.) resistor.

RS 485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in RS485 network. The permissible address range for The Meter is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed. The maximum latency time of an Meter is 200ms i.e. this is the amount of time that can pass before the first response character is output.

After sending any query through software (of the Master), it must allow 200ms of time to elapse before assuming that the Meter is not going to respond. If slave does not respond within 200 ms, Master can ignore the previous query and can issue fresh query to the slave.

The each byte in RTU mode has following format:

| | |
|---|---|
| | 8-bit binary, hexadecimal 0-9, A-F<br>2 hexadecimal characters contained in each 8-bit field of the message |
| **Format of Data Bytes** | 4 bytes (32 bits) per parameter.<br>Floating point format ( to IEEE 754)<br>Most significant byte first (Alternative least significant byte first) |
| **Error Checking Bytes** | 2 byte Cyclical Redundancy Check (CRC) |
| **Byte format** | 1 start bit,<br>8 data bits, least significant bit sent first<br>1 bit for even/odd parity<br>1 stop bit if parity is used; 1 or 2 bits if no parity |

Baud Rate is user selectable from the front panel between 4800, 9600, 19200, 38400 & 57600 bps.

**Function code :**

| | | |
|---|---|---|
| 03 | Read Holding Registers | Read content of read / write location ( 4X ) |
| 04 | Read input Registers | Read content of read only location ( 3X ) |
| 16 | Presets Multiple Registers | Set the content of read / write locations ( 4X ) |

**Exception Cases :** An exception code will be generated when Meter receives ModBus query with valid parity & error check but which contains some other error ( e.g. Attempt to set floating point variable to an invalid value) The response generated will be “Function code” ORed with HEX (80H ). The exception codes are listed below

| | | |
|---|---|---|
| 01 | Illegal function | The function code is not supported by Meter |
| 02 | Illegal Data Address | Attempt to access an invalid address or an attempt to read or write part of a floating point value |
| 03 | Illegal DataValue | Attempt to set a floating point variable to an invalid value |

## 3.1 Accessing 3X and 4X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer **TABLE 1** for the addresses of 3X and 4X registers used for parameters measured by the instrument. Each parameter is held in the 3X as well as 4X registers. Modbus Code 04 and 03 are used to access all parameters in 3X and 4X registers respectively.

**Example :**
To read parameter,

Current from 3X: Start address= 00 02 Number of registers = 02

Power from 4X: Start address= 10 04 Number of registers = 02

**Note : Number of registers = Number of parameters x 2**
Each Query for reading the data must be restricted to 40 parameters or less. Exceeding the 40 parameter limit will cause a ModBus exception code to be returned.

**Query for 3X read:**

| 01 (Hex) | 04 (Hex) | 00 (Hex) | 02(Hex) | 00 (Hex) | 02(Hex) | 30 (Hex) | 0A (Hex) |
|---|---|---|---|---|---|---|---|
| Device Address | Function Code | Start Address High | Start Address Low | Number of Registers Hi | Number of Registers Lo | CRC Low | CRC High |

**3X Response: Current Ch2 (219.254 A)**

| 01 (Hex) | 04 (Hex) | 04 (Hex) | 43 (Hex) | 5B (Hex) | 41 (Hex) | 21 (Hex) | 6F (Hex) | 9B (Hex) |
|---|---|---|---|---|---|---|---|---|
| Device Address | Function Code | Byte Count | Data Register1 High Byte | Data Register1 Low Byte | Data Register2 High Byte | Data Register2 Low Byte | CRC Low | CRC High |

Byte Count : Total number of data bytes received.

**Query for 4X read:**

| 01 (Hex) | 03 (Hex) | 10 (Hex) | 04(Hex) | 00 (Hex) | 02(Hex) | E0 (Hex) | C9 (Hex) |
|---|---|---|---|---|---|---|---|
| Device Address | Function Code | Start Address High | Start Address Low | Number of Registers Hi | Number of Registers Lo | CRC Low | CRC High |

**4X Response: Power Ch1 (2000 W)**

| 01 (Hex) | 03 (Hex) | 04 (Hex) | 44 (Hex) | FA (Hex) | 00 (Hex) | 00 (Hex) | CE (Hex) | F2 (Hex) |
|---|---|---|---|---|---|---|---|---|
| Device Address | Function Code | Byte Count | Data Register1 High Byte | Data Register1 Low Byte | Data Register2 High Byte | Data Register2 Low Byte | CRC Low | CRC High |

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
**(Note : Two consecutive 16 bit register represent one parameter.**)

## TABLE 1 : 3X and 4X register addresses for measured parameters

| Address (3X) | Address (4X) | Parameter Number | Parameter | Hex Address | | Hex Address | |
|---|---|---|---|---|---|---|---|
| | | | | High Byte | Low Byte | High Byte | Low Byte |
| 30001 | 44097 | 0 | Voltage | 00 | 00 | 10 | 00 |
| 30003 | 44099 | 1 | Current | 00 | 02 | 10 | 02 |
| 30005 | 44101 | 2 | Power | 00 | 04 | 10 | 04 |
| 30007 | 44103 | 3 | Import Energy | 00 | 06 | 10 | 06 |
| 30009 | 44105 | 4 | Import Energy OF | 00 | 08 | 10 | 08 |
| 30011 | 44107 | 5 | Export Energy | 00 | 0A | 10 | 0A |
| 30013 | 44109 | 6 | Export Energy OF | 00 | 0C | 10 | 0C |
| 30015 | 44111 | 7 | Import Ampere Hour | 00 | 0E | 10 | 0E |
| 30017 | 44113 | 8 | Import Ampere Hour OF | 00 | 10 | 10 | 10 |
| 30019 | 44115 | 9 | Export Ampere Hour | 00 | 12 | 10 | 12 |
| 30021 | 44117 | 10 | Export Ampere Hour OF | 00 | 14 | 10 | 14 |
| 30023 | 44119 | 11 | Import Power Demand | 00 | 16 | 10 | 16 |
| 30025 | 44121 | 12 | Export Power Demand | 00 | 18 | 10 | 18 |
| 30027 | 44123 | 13 | Import Current Demand | 00 | 1A | 10 | 1A |
| 30029 | 44125 | 14 | Export Current Demand | 00 | 1C | 10 | 1C |
| 30031 | 44127 | 15 | Max Voltage | 00 | 1E | 10 | 1E |
| 30033 | 44129 | 16 | Min Voltage | 00 | 20 | 10 | 20 |
| 30035 | 44131 | 17 | Max Current | 00 | 22 | 10 | 22 |
| 30037 | 44133 | 18 | Min Current | 00 | 24 | 10 | 24 |
| 30039 | 44135 | 19 | Max Import Power Demand | 00 | 26 | 10 | 26 |
| 30041 | 44137 | 20 | Max Export Power Demand | 00 | 28 | 10 | 28 |
| 30043 | 44139 | 21 | Max Import Current Demand | 00 | 2A | 10 | 2A |
| 30045 | 44141 | 22 | Max Export Current Demand | 00 | 2C | 10 | 2C |
| 30047 | 44143 | 23 | Import Energy on update rate | 00 | 2E | 10 | 2E |
| 30049 | 44145 | 24 | Import Energy on update rate OF | 00 | 30 | 10 | 30 |
| 30051 | 44147 | 25 | Export Energy on update rate | 00 | 32 | 10 | 32 |
| 30053 | 44149 | 26 | Export Energy on update rate OF | 00 | 34 | 10 | 34 |
| 30055 | 44151 | 27 | On Hour | 00 | 36 | 10 | 36 |
| 30057 | 44153 | 28 | Run Hour | 00 | 38 | 10 | 38 |
| 30059 | 44155 | 29 | No. of Interruptions | 00 | 3A | 10 | 3A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 30061 | 44157 | 30 | Old Import Energy | 00 | 3C | 10 | 3C |
| 30063 | 44159 | 31 | Old Import Energy OF | 00 | 3E | 10 | 3E |
| 30065 | 44161 | 32 | Old Export Energy | 00 | 40 | 10 | 40 |
| 30067 | 44163 | 33 | Old Export Energy OF | 00 | 42 | 10 | 42 |
| 30069 | 44165 | 34 | Old Import Ampere Hour | 00 | 44 | 10 | 44 |
| 30071 | 44167 | 35 | Old Import Ampere Hour OF | 00 | 46 | 10 | 46 |
| 30073 | 44169 | 36 | Old Export Ampere Hour | 00 | 48 | 10 | 48 |
| 30075 | 44171 | 37 | Old Export Ampere Hour OF | 00 | 4A | 10 | 4A |
| 30077 | 44173 | 38 | Old Max Import Power Demand | 00 | 4C | 10 | 4C |
| 30079 | 44175 | 39 | Old Max Export Power Demand | 00 | 4E | 10 | 4E |
| 30081 | 44177 | 40 | Old Max Import Current Demand | 00 | 50 | 10 | 50 |
| 30083 | 44179 | 41 | Old Max Export Current Demand | 00 | 52 | 10 | 52 |
| 30085 | 44181 | 42 | Old On Hour | 00 | 54 | 10 | 54 |
| 30087 | 44183 | 43 | Old Run Hour | 00 | 56 | 10 | 56 |
| 30089 | 44185 | 44 | Old No. of Interruptions | 00 | 58 | 10 | 58 |
| 30091 | 44187 | 45 | Relay 1 Status | 00 | 5A | 10 | 5A |
| 30093 | 44189 | 46 | Relay 2 Status | 00 | 5C | 10 | 5C |
| 30099 | 44195 | 49 | Timer 1 On Delay | 00 | 62 | 10 | 62 |
| 30101 | 44197 | 50 | Timer 2 On Delay | 00 | 64 | 10 | 64 |
| 30107 | 44203 | 53 | Timer 1 Off Delay | 00 | 6A | 10 | 6A |
| 30109 | 44205 | 54 | Timer 2 Off Delay | 00 | 6C | 10 | 6C |
| 30115 | 44211 | 57 | Timer 1 No of Cycles | 00 | 72 | 10 | 72 |
| 30117 | 44213 | 58 | Timer 2 No of Cycles | 00 | 74 | 10 | 74 |
| 30123 | 44219 | 61 | RTC Min | 00 | 7A | 10 | 7A |
| 30125 | 44221 | 62 | RTC Hour | 00 | 7C | 10 | 7C |
| 30127 | 44223 | 63 | RTC Day of Week | 00 | 7E | 10 | 7E |
| 30129 | 44225 | 64 | RTC Date | 00 | 80 | 10 | 80 |
| 30131 | 44227 | 65 | RTC Month | 00 | 82 | 10 | 82 |
| 30133 | 44229 | 66 | RTC Year | 00 | 84 | 10 | 84 |
| 30135 | 44231 | 67 | RTC Complete Date* | 00 | 86 | 10 | 86 |
| 30137 | 44233 | 68 | RTC Complete Time* | 00 | 88 | 10 | 88 |
| 30139 | 44235 | 69 | Impulse Constant | 00 | 8A | 10 | 8A |

* RTC complete date is shown in "ddmmyy" format & RTC complete time is shown in "hh.mm" format.

## TABLE 2 : 3X and 4X register addresses for 32-bit Integer Energy

| Address (3X) | Address (4X) | Parameter number | Parameter | Hex Address | | Hex Address | |
|---|---|---|---|---|---|---|---|
| | | | | High Byte | Low Byte | High Byte | Low Byte |
| 30769 | 44865 | 0 | Import Energy | 03 | 00 | 13 | 00 |
| 30771 | 44867 | 1 | Import Energy OF | 03 | 02 | 13 | 02 |
| 30773 | 44869 | 2 | Export Energy | 03 | 04 | 13 | 04 |
| 30775 | 44871 | 3 | Export Energy OF | 03 | 06 | 13 | 06 |
| 30777 | 44873 | 4 | Import Energy on update rate* | 03 | 08 | 13 | 08 |
| 30779 | 44875 | 5 | Import Energy on update rate OF* | 03 | 0A | 13 | 0A |
| 30781 | 44877 | 6 | Export Energy on update rate* | 03 | 0C | 13 | 0C |
| 30783 | 44879 | 7 | Export Energy on update rate OF* | 03 | 0E | 13 | 0E |
| 30785 | 44881 | 8 | Import Ampere Hour | 03 | 10 | 13 | 10 |
| 30787 | 44883 | 9 | Import Ampere Hour OF | 03 | 12 | 13 | 12 |
| 30789 | 44885 | 10 | Export Ampere Hour | 03 | 14 | 13 | 14 |
| 30791 | 44887 | 11 | Export Ampere Hour OF | 03 | 16 | 13 | 16 |
| 30793 | 44889 | 12 | On Hour | 03 | 18 | 13 | 18 |
| 30795 | 44891 | 13 | Run Hour | 03 | 1A | 13 | 1A |
| 30797 | 44893 | 14 | Old Import Energy | 03 | 1C | 13 | 1C |
| 30799 | 44895 | 15 | Old Import Energy OF | 03 | 1E | 13 | 1E |
| 30801 | 44897 | 16 | Old Export Energy | 03 | 20 | 13 | 20 |
| 30803 | 44899 | 17 | Old Export Energy OF | 03 | 22 | 13 | 22 |
| 30805 | 44901 | 18 | Old Import Ampere Hour | 03 | 24 | 13 | 24 |
| 30807 | 44903 | 19 | Old Import Ampere Hour OF | 03 | 26 | 13 | 26 |
| 30809 | 44905 | 20 | Old Export Ampere Hour | 03 | 28 | 13 | 28 |
| 30811 | 44907 | 21 | Old Export Ampere Hour OF | 03 | 2A | 13 | 2A |
| 30813 | 44909 | 22 | Old On Hour | 03 | 2C | 13 | 2C |
| 30815 | 44911 | 23 | Old Run Hour | 03 | 2E | 13 | 2E |

*These values are updated depending on update rate which can be changed by user. For example, if user has set update rate 10 minute, then the values on these registers will be updated every 10 min.

## 3.2 Accessing 4 X register for Reading & Writing Settings:

Each setting is held in the 4X registers. ModBus code 03 is used to read the current setting & code 16 is used to write/change the setting. Refer **TABLE 3** for 4X Register addresses.

**Example: Reading Nominal Voltage**

**Nominal Voltage**: Start address = 1A (Hex) Number of registers = 02

(Note: Number of registers = Number of Parameters x 2)

**Query :**

| | |
|---|---|
| Device Address | 01 (Hex) |
| Function Code | 03 (Hex) |
| Start Address High | 00 (Hex) |
| Start Address Low | 1A (Hex) |
| Number of Registers High | 00 (Hex) |
| Number of Registers Low | 02 (Hex) |
| CRC Low | E5 (Hex) |
| CRC High | CC (Hex) |

**Response (Nominal voltage 24V):**

| | |
|---|---|
| Device Address | 01 (Hex) |
| Function Code | 03 (Hex) |
| Byte Count | 04 (Hex) |
| Data Register1 High Byte | 41 (Hex) |
| Data Register1 Low Byte | C0 (Hex) |
| Data Register2 High Byte | 00 (Hex) |
| Data Register2 Low Byte | 00(Hex) |
| CRC Low | 44 (Hex) |
| CRC High | C6 (Hex) |

Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register High: Most significant 8 bits of Number of registers requested.
Number of register Low:Least significant 8 bits of Number of registers requested.

Byte Count : Total number of data bytes received.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
**(Note : Two consecutive 16 bit register represent one parameter.**)

## Example : Writing Nominal Voltage

Nominal Voltage: Start address = 1A (Hex) Number of registers = 02

**Query:(Change Nominal Voltage to 48 V )**

| | |
|---|---|
| Device Address | 01 (Hex) |
| Function Code | 10 (Hex) |
| Starting Address Hi | 00 (Hex) |
| Starting Address Lo | 1A(Hex) |
| Number of Registers Hi | 00 (Hex) |
| Number of Registers Lo | 02(Hex) |
| Byte Count | 04 (Hex) |
| Data Register-1High Byte | 42 (Hex) |
| Data Register-1 Low Byte | 40(Hex) |
| Data Register-2 High Byte | 00(Hex) |
| Data Register-2 Low Byte | 00(Hex) |
| CRC Low | 67 (Hex) |
| CRC High | 70 (Hex) |

**Response:**

| | |
|---|---|
| Device Address | 01 (Hex) |
| Function Code | 10 (Hex) |
| Start Address High | 00 (Hex) |
| Start Address Low | 1A(Hex) |
| Number of Registers Hi | 00 (Hex) |
| Number of Registers Lo | 02(Hex) |
| CRC Low | 60 (Hex) |
| CRC High | 0F (Hex) |

Byte Count : Total number of data bytes received.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.
**(Note : Two consecutive 16 bit register represent one parameter.**)

## TABLE 3 : 4X register addresses

| Address (Register) | Parameter No. | Parameter | Read/ Write | Modbus Start Addr. Hex | | Default Value |
|---|---|---|---|---|---|---|
| | | | | High Byte | Low Byte | |
| 40003 | 1 | Demand Period | R/Wp | 00 | 02 | 1 |
| 40005 | 2 | Reset parameters | R/Wp | 00 | 04 | 0 |
| 40007 | 3 | RS485 Setup Code | R/Wp | 00 | 06 | 4 |
| 40009 | 4 | Modbus address | R/Wp | 00 | 08 | 1 |
| 40027 | 5 | Nominal Voltage | R/Wp | 00 | 1A | 1500 |
| 40029 | 6 | Auto Detect Nominal Voltage | R/Wp | 00 | 1C | 0 |
| 40033 | 7 | Current - Full Scale | R/Wp | 00 | 20 | 5 |
| 40041 | 8 | Current - Shunt | R/Wp | 00 | 28 | 75 |
| 40053 | 9 | Energy update rate | R/Wp | 00 | 34 | 15 |
| 40061 | 10 | Energy Output | R/Wp | 00 | 3C | 2 |
| 40069 | 11 | Noise Current Cutoff | R/Wp | 00 | 44 | 0 |
| 40073 | 12 | Register order | R/Wp | 00 | 48 | 0 |
| 40075 | 13 | Auto Scroll | R/Wp | 00 | 4A | 0 |
| 40077 | 14 | Reverse Lock | R/Wp | 00 | 4C | 0 |
| 40085 | 15 | Energy Digit Reset Count | R/Wp | 00 | 54 | 8 |
| 40093 | 16 | Factory Reset | R/Wp | 00 | 5C | 0 |
| 40095 | 17 | Password | R/Wp | 00 | 5E | 0 |
| 40097 | 18 | Serial Number | R/Wp | 00 | 60 | - |
| 40099 | 19 | Model Number | R/Wp | 00 | 62 | 6000 |
| 40101 | 20 | Version Number | R/Wp | 00 | 64 | - |
| 40103 | 21 | User Assignable Screen On/OFF | R/Wp | 00 | 66 | 0 |
| 40105 | 22 | User Screen 1 | R/Wp | 00 | 68 | 1 |
| 40107 | 23 | User Screen 2 | R/Wp | 00 | 6A | 2 |
| 40109 | 24 | User Screen 3 | R/Wp | 00 | 6C | 3 |
| 40111 | 25 | User Screen 4 | R/Wp | 00 | 6E | 6 |
| 40113 | 26 | User Screen 5 | R/Wp | 00 | 70 | 7 |
| 40115 | 27 | User Screen 6 | R/Wp | 00 | 72 | 10 |
| 40117 | 28 | User Screen 7 | R/Wp | 00 | 74 | 11 |

* This value differs according to meter range. It is 48, 110 & 1000 for 10-60 V, 61-200 V & 201-1000 V meters respectively.

**TABLE 3 : Continued...**

| Address (Register) | Parameter No. | Parameter | Read/ Write | Modbus Start Addr. Hex | | Default Value |
|---|---|---|---|---|---|---|
| | | | | High Byte | Low Byte | |
| 40119 | 29 | User Screen 8 | R/Wp | 00 | 76 | 14 |
| 40121 | 30 | User Screen 9 | R/Wp | 00 | 78 | 15 |
| 40123 | 31 | User Screen 10 | R/Wp | 00 | 7A | 18 |
| 40125 | 32 | Pulse Divisor for pulse output 1 | R/Wp | 00 | 7C | 1 |
| 40127 | 33 | Pulse Divisor for pulse output 2 | R/Wp | 00 | 7E | 1 |
| 40133 | 34 | Pulse Width for pulse output | R/Wp | 00 | 84 | 100 |
| 40219 | 35 | Relay 1 Output Select | R/Wp | 00 | DA | |
| 40221 | 36 | Para Select / No of cycles / Weekly Repeat | R/Wp | 00 | DC | |
| 40223 | 37 | Relay 1 Configuration Select | R/Wp | 00 | DE | |
| 40225 | 38 | Relay 1 Trip point | R/Wp | 00 | E0 | |
| 40227 | 39 | Relay 1 Hysteresis | R/Wp | 00 | E2 | |
| 40229 | 40 | Relay 1 / Timer 1 On Delay (Energize) | R/Wp | 00 | E4 | |
| 40231 | 41 | Relay 1 / Timer 1 Off Delay (De-energize) | R/Wp | 00 | E6 | |
| 40233 | 42 | Relay 2 Output Select | R/Wp | 00 | E8 | |
| 40235 | 43 | Para Select / No of cycles / Weekly Repeat | R/Wp | 00 | EA | 0 |
| 40237 | 44 | Relay 2 Configuration Select | R/Wp | 00 | EC | |
| 40239 | 45 | Relay 2 Trip point | R/Wp | 00 | EE | |
| 40241 | 46 | Relay 2 Hysteresis | R/Wp | 00 | F0 | |
| 40243 | 47 | Relay 2 / Timer 2 On Delay (Energize) | R/Wp | 00 | F2 | |
| 40245 | 48 | Relay 2 / Timer 2 Off Delay (De-energize) | R/Wp | 00 | F4 | |
| 40303 | 49 | Relay 1 Status & Trip | R/Wp | 01 | 2E | |
| 40305 | 50 | Relay 2 Status & Trip | R/Wp | 01 | 30 | |
| 40311 | 51 | Timer 1 Start / Stop | R/Wp | 01 | 36 | |
| 40313 | 52 | Timer 2 Start / Stop | R/Wp | 01 | 38 | |
| 40319 | 53 | Import Energy Starting Count | R/Wp | 01 | 3E | |
| 40327 | 54 | Export Energy Starting Count | R/Wp | 01 | 46 | |
| 40337 | 55 | RTC Min | R/Wp | 01 | 50 | - |
| 40339 | 56 | RTC Hour | R/Wp | 01 | 52 | - |
| 40341 | 57 | RTC Day of Week | R | 01 | 54 | - |

**TABLE 3 : Continued...**

| Address (Register) | Parameter No. | Parameter | Read/ Write | Modbus Start Addr. Hex | | Default Value |
|---|---|---|---|---|---|---|
| | | | | High Byte | Low Byte | |
| 40343 | 58 | RTC Date | R/Wp | 01 | 56 | |
| 40345 | 59 | RTC Month | R/Wp | 01 | 58 | |
| 40347 | 60 | RTC Year | R/Wp | 01 | 5A | |
| 40349 | 61 | RTC Complete Date | R/Wp | 01 | 5C | |
| 40351 | 62 | RTC Complete Time | R/Wp | 01 | 5E | |
| 40353 | 63 | Current Screen No | R | 01 | 60 | 1 |
| 40361 | 64 | Password for Energy Starting Count | R/Wp | 01 | 68 | |
| 40365 | 65 | Event-based Datalog Select | R/Wp | 01 | 6C | |
| 40367 | 66 | Time-based Datalog Select | R/Wp | 01 | 6E | |
| 40369 | 67 | Time-based Datalog Interval Selection | R/Wp | 01 | 70 | |
| 40371 | 68 | Logging Parameter Count | R/Wp | 01 | 72 | |
| 40373 | 69 | Datalog Parameter 1 | R/Wp | 01 | 74 | |
| 40375 | 70 | Datalog Parameter 2 | R/Wp | 01 | 76 | |
| 40377 | 71 | Datalog Parameter 3 | R/Wp | 01 | 78 | |
| 40379 | 72 | Datalog Parameter 4 | R/Wp | 01 | 7A | |
| 40381 | 73 | Datalog Parameter 5 | R/Wp | 01 | 7C | |
| 40383 | 74 | Datalog Parameter 6 | R/Wp | 01 | 7E | 0 |
| 40385 | 75 | Datalog Parameter 7 | R/Wp | 01 | 80 | |
| 40387 | 76 | Datalog Parameter 8 | R/Wp | 01 | 82 | |
| 40389 | 77 | Datalog Parameter 9 | R/Wp | 01 | 84 | |
| 40391 | 78 | Datalog Parameter 10 | R/Wp | 01 | 86 | |
| 40393 | 79 | Datalog Parameter 11 | R/Wp | 01 | 88 | |
| 40395 | 80 | Datalog Parameter 12 | R/Wp | 01 | 8A | |
| 40397 | 81 | Datalog Parameter 13 | R/Wp | 01 | 8C | |
| 40399 | 82 | Datalog Parameter 14 | R/Wp | 01 | 8E | |
| 40401 | 83 | Datalog Parameter 15 | R/Wp | 01 | 90 | |
| 40403 | 84 | Datalog Parameter 16 | R/Wp | 01 | 92 | |
| 40405 | 85 | Datalog Parameter 17 | R/Wp | 01 | 94 | |
| 40407 | 86 | Datalog Parameter 18 | R | 01 | 96 | |

**TABLE 3 : Continued...**

| Address (Register) | Parameter No. | Parameter | Read/ Write | Modbus Start Addr. Hex | | Default Value |
|---|---|---|---|---|---|---|
| | | | | High Byte | Low Byte | |
| 40409 | 87 | Datalog Parameter 19 | R/Wp | 01 | 98 | 0 |
| 40411 | 88 | Datalog Parameter 20 | R/Wp | 01 | 9A | 0 |
| 40413 | 89 | Datalog Parameter 21 | R/Wp | 01 | 9C | 0 |
| 40415 | 90 | Datalog Parameter 22 | R/Wp | 01 | 9E | 0 |
| 40417 | 91 | Datalog Parameter 23 | R/Wp | 01 | A0 | 0 |
| 40419 | 92 | Datalog Parameter 24 | R/Wp | 01 | A2 | 0 |
| 40421 | 93 | Datalog Parameter 25 | R/Wp | 01 | A4 | 0 |
| 40423 | 94 | Datalog Parameter 26 | R/Wp | 01 | A6 | 0 |
| 40425 | 95 | Datalog Parameter 27 | R/Wp | 01 | A8 | 0 |
| 40427 | 96 | Datalog Parameter 28 | R/Wp | 01 | AA | 0 |
| 40429 | 97 | Datalog Parameter 29 | R/Wp | 01 | AC | 0 |
| 40431 | 98 | Datalog Parameter 30 | R/Wp | 01 | AE | 0 |
| 40433 | 99 | Load Profile Datalog Select | R/Wp | 01 | B0 | 0 |
| 40435 | 100 | Start Date of Load Profile Datalog | R | 01 | B2 | 0 |
| 40477 | 101 | Restart Meter | R/Wp | 01 | DC | 0 |
| 40479 | 102 | EEPROM Error | R | 01 | DE | 0 |
| 40481 | 103 | RTC Error | R | 01 | E0 | 0 |
| 40483 | 104 | Flash Error | R | 01 | E2 | 0 |
| 40485 | 105 | Write in Process | R | 01 | E4 | 0 |
| 40487 | 106 | RTC Battery Low | R | 01 | E6 | 0 |

**NOTE:** Wp - Write protected, R - Read only, R/W - Read & Write, R/Wp - Read & Write protected

## TABLE 4: Explanation for 4X register:

**Note: Writing any invalid values (non-applicable values) to any of the following locations will result in modbus error.**

| Address | Parameter | Description |
|---|---|---|
| 40003 | Demand Integration Time | Demand integration time represents demand time in minutes. The applicable values are 1-30. |
| 40005 | Reset parameters | This address is used to reset different parameters. Write specific value to this register to reset the corresponding parameter. Refer Table 5. |
| 40007 | RS485 Setup Code | This address is used to set the baud rate, Parity, Number of stop bits. Refer Table 6. |
| 40009 | Modbus address | This value is used to read and write device address of the device. Valid values are 1-247. |
| 40027 | Nominal Voltage | This address is used to read and write nominal voltage of the system.Valid values range is as following.<br>301 - 1500V |
| 40029 | Auto Detect Nominal Voltage | Writing 1 here will change the value of nominal voltage of the meter to a preset value according to the input voltage at that time irrespective of voltage polarity. Refer Table 7. |
| 40033 | Current - Full Scale | This address is used to read and write full scale current values in ampere. Valid value range is 1-9999 A. |
| 40041 | Current - Shunt | This address is used to read and write the shunt voltage drop for full scale current in millivolts. Valid value range is 50-150 mV. |
| 40053 | Energy update rate | This address is used to specify update rate of energy in corresponding 3X registers. The valid values for update rate are from 1 to 60 min. |
| 40061 | Energy Output | This address is used to set energy output in Wh, kWh & MWh. Write one of the following value to this address.<br>1: Energy in Wh (only valid when nominal power is less than 60kW)<br>2: Energy in KWh<br>3: Energy in MWh |

| Address | Parameter | Description |
|---|---|---|
| 40069 | Noise Current Cutoff | This address is used to activate or de-activate the noise current elimination. Noise current is in percentage of nominal current. Valid values 0-30. 0: deactivate 1-30: noise current is cut off below this percent of nominal current. |
| 40073 | Register order | Word Order controls the order in which meter receives or sends floating - point numbers:- normal or reversed register order . In normal mode, the two registers that make up a floating point numbers are sent most significant bytes first. In reversed register mode , the two registers that make up a floating point numbers are sent least significant bytes first. To set the mode, write the value '2141.0' into this register-the instrument will detect the order used to send this value and set that order for all ModBus transaction involving floating point numbers. |
| 40075 | Auto Scroll | This address is used to activate or de-activate the auto scrolling. 0: Deactivate 1: Activate |
| 40077 | Reverse Lock | This address is used to read and write the reverse locking parameter. Reverse locking is when the current or power is in the opposite direction of the desired direction, the energy and ampere-hour accumulation is stopped. Valid values are:<br>0: No reverse locking<br>1: Positive/ Import locking<br>2: Negative/ Export locking |
| 40085 | Energy Digit Reset Count | This address is used to set Energy Digit Reset Count value. Energy count can be configured to reset on 6,7 or 8. |
| 40093 | Factory Reset | This address allows the user to reset the instrument to factory settings. Refer the Default Values in Table 3 for factory settings. Write 100 at this address to reset the instrument. |
| 40095 | Password | This address is used to set & reset the password. Valid Range of Password can be set is 0000 - 9999.<br>1) If password lock is present & if this location is read it will return zero.<br>2) If Password lock is absent & if this location is read it will return one.<br>3) If password lock is present & to disable this lock first send valid password to this location then write "0000" to this location.<br>4) If password lock is present & to modify 4X parameter first send valid password to this location so that 4X parameter will be accessible for modification.<br>5) If in any of the above case invalid password is sent then meter will return exceptional error 2. |
| 40097 | Serial Number | This address is read only and displays the serial number of the meter. |

| Address | Parameter | Description |
|---|---|---|
| 40099 | Model Number | This address is read only and displays the Model number of the meter. |
| 40101 | Firmware Version Number | This address is read only and displays the firmware version of the meter. |
| 40103 | User Assignable Screen On/OFF | This address is used to read and write if the user assignable screens are on or off and how many user screens are shown. Valid values are:<br>0: Deactivate<br>1-10: This many user screens are shown |
| 40105 | User Screen 1 | These addresses are used to assign the screen numbers to user screens 1 to 10 respectively. Refer to Table 15 for screen numbers. |
| 40107 | User Screen 2 | |
| ... | ... | |
| 40123 | User Screen 10 | |
| 40125 | Pulse Divisor for pulse output 1 | This address is used to set pulse divisor of the Pulse output. Refer Table 8. |
| 40127 | Pulse Divisor for pulse output 2 | |
| 40133 | Pulse Width for pulse output | This address is used to set pulse width of the Pulse output. Write one of the following values to this address:<br>60 : 60 ms<br>100 : 100 ms<br>200 : 200 ms |
| 40219 | Relay 1 Output Select | This address is used to select the Relay operation. Write one of the following values to this address.<br>0: None<br>1: Limit<br>2: Pulse<br>3: Timer<br>4: Remote<br>5: Reverse Lock<br>6: RTC relay |

| Address | Parameter | Description |
|---|---|---|
| 40221 | Para Select / No of cycles / Weekly Repeat | This address is used to assign the Parameter to Relay.<br>Limit relay: Refer Table 9<br>Pulse relay: Refer Table 10<br>Timer relay: Refer Table 11<br>RTC relay: Refer Table 13 |
| 40223 | Relay 1 Configuration Select | This address is used to read and write the relay configuration. Refer Table 14. |
| 40225 | Limit 1 trip point | This address is used to set the trip point in %. Any value between 10 to 100 for Lo-alarm & 10 to120 for Hi-alarm can be written to this address. For energy and ampere hour parameters the valid range range is 10-9999999. (refer Table 9) |
| 40227 | Hysteresis (Limit 1) | This address is used to set the hysteresin percentage. Valid values are between 0.5 to 50.0 |
| 40229 | Relay 1 / On Delay (Energize) / On time | This address is used to set the Energizing delay in seconds in range of 1-9999. For RTC relay this range is 00.00 to 23.59. |
| 40231 | Relay 1 / Off Delay (De-energize) / Off time | This address is used to set the De-energizing delay in seconds in range of 1-9999. For RTC relay this range is 00.00 to 23.59. |
| 40233 | Relay 2 Output Select | Same as relay 1. |
| 40235 | Para Select / No of cycles / Weekly Repeat | |
| 40237 | Relay 2 Configuration Select | |
| 40239 | Limit 2 trip point | |
| 40241 | Hysteresis (Limit 2) | |
| 40243 | Relay 2 / On Delay (Energize) / On time | |
| 40245 | Relay 2 / Off Delay (De-energize) / Off time | |

| Address | Parameter | Description |
|---|---|---|
| 40303 | Relay 1 Status & Remote Operation | These values show if the relay is Energized or De-energised.<br>In remote operation mode The uses can write these values.<br>0: De-energized<br>1: Energized |
| 40305 | Relay 2 Status & Remote Operation | |
| 40311 | Timer 1 Start / Stop | These addresses can be used to start or stop the timers.<br>0: Stop<br>1: Start |
| 40313 | Timer 2 Start / Stop | |
| 40319 | Import Energy Starting Count | The user can set energy starting count in these registers (before the user can write values to these locations he/she needs to check register 40361 for password lock). Valid range is 0-9999999. |
| 40327 | Export Energy Starting Count | |
| 40337 | RTC Min | This address is used to read and write the minute part from RTC. Valid range 0-59. |
| 40339 | RTC Hour | This register decides the hour part from RTC. Valid range 0-23. |
| 40341 | RTC Day of Week | This register shows the day of week part from RTC. This address is read only. |
| | | 1: Sunday<br>2: Monday<br>3: Tuesday<br>4:Wednesay<br>5: Thursday<br>6: Friday<br>7: Saturday |

| Address | Parameter | Description |
|---|---|---|
| 40343 | RTC Date | This address is used to read and write the date part from RTC. |
| 40345 | RTC Month | This address is used to read and write the month part from RTC. |
| 40347 | RTC Year | This address is used to read and write the year part from RTC. Valid range 2000-2099. |
| 40349 | RTC Complete Date | This address is used to read and write full date in “ddmmyy” format from RTC. |
| 40351 | RTC Complete Time | This address is used to read and write complete time in “hh.mm” format from RTC. |
| 40353 | Current Screen No | This read only register shows the screen number of the screen currently being displayed. |
| 40361 | Password for Energy Starting Count | This address is used to set & reset the password for energy starting count. This is additional protection for Energy Starting Count. This address can only be modified after entering a valid password at address 40095. Valid Range of Password can be set is 0000 - 9999.<br>1) If password lock is present & if this location is read it will return zero.<br>2) If Password lock is absent & if this location is read it will return one.<br>3) If password lock is present & to disable this lock first send valid password to this location then write “0000” to this location.<br>4) If password lock is present; to modify “Energy Starting Count”, first send valid password to this location so that “Energy Starting Count” will be accessible for modification.<br>5) In any of the above case if invalid password is sent, the meter will return exceptional error 2. |
| 40365 | Event-based Datalog Select | This register is used to enable or disable event based datalogging.<br>0: Disabled<br>1: Enabled |
| 40367 | Time-based Datalog Select | This register is used to enable or disable time based datalogging.<br>0: Disabled<br>1: Enabled |
| 40369 | Time-based Datalog Interval Selection | This address is used to read and write the interval between consecutive time log entries in minutes. Valid value range 1-60 |
| 40371 | Logging Parameter Count | This value decides the number of parameters to be logged in time based datalogging. |

| Address | Parameter | Description |
|---|---|---|
| 40373 to 40431 | Datalog Parameter 1 to 30 | These addresses are used to read and write the parameters to be logged in time based logging. Valid value range 0-44. Refer Table 1. |
| 40433 | Load Profile Datalog Select | This register is used to enable or disable load profile logging.<br>0: Disabled<br>1: Enabled |
| 40435 | Start Date of Load Profile Datalog | This value shows the starting date of Load Profile datalog.<br>This address is read only. |
| 40477 | Restart Meter | This register can be used to restart the meter by writing 1. |
| 40479 | EEPROM Error | These values show the errors present if there are any (these registers are read only),<br>0: No Error<br>1: Error Present |
| 40481 | RTC Error | |
| 40483 | Flash Error | |
| 40485 | Write in Process | This value shows if the meter is busy in writing process (this register is read only).<br>0: Idle<br>1: Busy Writing |
| 40487 | RTC Battery Low | This value shows if the RTC battery is low (this register is read only).<br>0: Battery normal<br>1: Battery low |

**TABLE 5: Reset Parameters**

| Para No / Code | Parameter |
|---|---|
| 0 | None |
| 1 | All |
| 2 | Run Hour & On Hour |
| 3 | No of Interrupts |
| 4 | High V & A |
| 5 | Low V & A |
| 6 | Energy |
| 7 | Demand |
| 8 | AH |
| 9 | Time Based Log |
| 10 | Load Profile Log |

**TABLE 6: Communication Parameters**

| Baud Rate | Parity | Stop bit | Decimal Value |
|---|---|---|---|
| 4800 | NONE | 1 | 0 |
| 4800 | NONE | 2 | 1 |
| 4800 | EVEN | 1 | 2 |
| 4800 | ODD | 1 | 3 |
| 9600 | NONE | 1 | 4 |
| 9600 | NONE | 2 | 5 |
| 9600 | EVEN | 1 | 6 |
| 9600 | ODD | 1 | 7 |
| 19200 | NONE | 1 | 8 |
| 19200 | NONE | 2 | 9 |
| 19200 | EVEN | 1 | 10 |
| 19200 | ODD | 1 | 11 |
| 38400 | NONE | 1 | 12 |
| 38400 | NONE | 2 | 13 |
| 38400 | EVEN | 1 | 14 |
| 38400 | ODD | 1 | 15 |
| 57600 | NONE | 1 | 16 |
| 57600 | NONE | 2 | 17 |
| 57600 | EVEN | 1 | 18 |
| 57600 | ODD | 1 | 19 |

**TABLE 7: Auto Detection of System Nominal Voltage**

| Nominal Voltage | Input Voltage |
|---|---|
| **301 - 1500V Meter** | |
| 400 | < 500 |
| 600 | >= 501 & < 750 |
| 800 | >= 751 & < 1000 |
| 1500 | < 1000 |

**TABLE 8: For energy output in Wh**

| Pulse Rate | | |
|---|---|---|
| **Divisor** | **Pulse** | **Channel Power** |
| 1 | 1per Whr | Up to 3600W |
| | 1per kWhr | Up to 60kW |
| 10 | 1per 10Whr | Up to 3600W |
| | 1per 10kWhr | Up to 60kW |
| 100 | 1per 100Whr | Up to 3600W |
| | 1per 100kWhr | Up to 60kW |
| 1000 | 1per 1000Whr | Up to 3600W |
| | 1per 1000kWhr | Up to 60kW |

**For energy output in kWh**

| Pulse Rate | | |
|---|---|---|
| **Divisor** | **Pulse** | **Channel Power** |
| 1 | 1per kWhr | Up to 3600kW |
| | 1per MWhr | above 3600kW |

**For energy output in MWh**

| Pulse Rate | |
|---|---|
| **Divisor** | **Pulse** |
| 1 | 1per MWhr |

**TABLE 9: Parameter for Limit Output**

| Para No. | Parameter | Range |
|---|---|---|
| 0 | None | ------- |
| 1 | Voltage | ±10 - ±110% |
| 2 | Current | ±10 - ±120% |
| 3 | Power | ±10 - ±110% |
| 4 | Import Power Demand | 10 - 120% |
| 5 | Export Power Demand | 10 - 120% |
| 6 | Import Current Demand | 10 - 120% |
| 7 | Export Current Demand | 10 - 120% |
| 8 | Max Import Power Demand | 10 - 120% |
| 9 | Max Export Power Demand | 10 - 120% |
| 10 | Max Import Current Demand | 10 - 120% |
| 11 | Max Export Current Demand | 10 - 120% |
| 12 | Import Ampere Hour | 10 - 9999999 |
| 13 | Export Ampere Hour | 10 - 9999999 |
| 14 | Import Energy | 10 - 9999999 |
| 15 | Export Energy | 10 - 9999999 |

**TABLE 10: Parameter for Pulse Output**

| Code | Configuration |
|---|---|
| 0 | Import Energy |
| 1 | Export Energy |

**TABLE 11: Number of Cycles for Timer Relay**

| Code | Description |
|---|---|
| 0 | Unlimited |
| 1 to 9999 | Fixed Cycles |

**TABLE 13: Weekly Repeat for RTC Relay**

| Code | Description |
|---|---|
| 1XXXXXXX | Eg 11010000 means relay will operate only on Sun & Tue |
| | 1 = Sunday, 7 = Saturday |

**TABLE 14: Relay Configuration**

**For Limit Relay**

| Code | Configuration |
|---|---|
| 0 | Hi - alarm & energised Relay |
| 1 | Hi - alarm & De-energised Relay |
| 2 | Lo - alarm & Energised Relay |
| 3 | Lo - alarm & De-energised Relay |

**For Timer, Reverse lock or RTC relay**

| Code | Configuration |
|---|---|
| 0 | Energize On Start |
| 1 | De-energize On Start |

## TABLE 15 : Measurement Screens

| Screen No. | Screen Name |
|---|---|
| 1 | Voltage |
| 2 | Current |
| 3 | Power |
| 4 | Import Energy |
| 5 | Import Energy OF |
| 6 | Export Energy |
| 7 | Export Energy OF |
| 8 | Import Ampere Hour |
| 9 | Import Ampere Hour OF |
| 10 | Export Ampere Hour |
| 11 | Export Ampere Hour OF |
| 12 | Import Power Demand |
| 13 | Export Power Demand |
| 14 | Import Current Demand |
| 15 | Export Current Demand |
| 16 | On - hrs |
| 17 | Run - hrs |
| 18 | Max Voltage |
| 19 | Min Voltage |
| 20 | Max Current |
| 21 | Min Current |
| 22 | Import Max Power Demand |
| 23 | Export Max Power Demand |
| 24 | Import Max Current Demand |
| 25 | Export Max Current Demand |
| 26 | No of interruptions |
| 27 | Old Import Energy |
| 28 | Old Import Energy OF |
| 29 | Old Export Energy |
| 30 | Old Export Energy OF |

| Screen No. | Screen Name |
|---|---|
| 31 | Old Import Amp Hour |
| 32 | Old Import Amp Hour OF |
| 33 | Old Export Amp Hour |
| 34 | Old Export Amp Hour OF |
| 35 | Old Max Import Power Demand |
| 36 | Old Max Export Power Demand |
| 37 | Old Max Import Current Demand |
| 38 | Old Max Export Current Demand |
| 39 | Old No of interruptions |
| 40 | Old On Hour |
| 41 | Old Run Hour |
| 42[1] | Timer 1 Number of Cycles |
| 43[1] | Timer 1 On Delay |
| 44[1] | Timer 1 Off Delay |
| 45[1] | Timer 2 Number of Cycles |
| 46[1] | Timer 2 On Delay |
| 47[1] | Timer 2 Off Delay |
| 48[2] | RTC Complete Date |
| 49[2] | RTC Complete Time |

**NOTE :**

1. These screens will be available only with Relay Addon card.
2. These screens will be available only in the Datalogging variant.

## 3.3 User Assignable Modbus Registers:

The Multifunction Energy Meter contains 20 user assignable registers in the address range of 0x200 (30513) to 0x226 (30551) for 3X registers (**see TABLE 16)** and address range of 0x1E00 (47681) to 0x1E26 (47719) for 4X registers (**see TABLE 17**).

Any of the parameter addresses (3X register addresses and 4X register addresses **TABLE 1**) accessible in the instrument can be mapped to these 20 user assignable registers.

Parameters (3X and 4X registers addresses) that reside in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.

The actual address of the parameters (3X and 4X registers addresses) which are to be accessed via address 0x200 to 0x226 (or 0x1E00 to 0x1E26) are specified in 4X Register 0x200 to 0x213.

(**see TABLE 18**)

## TABLE 16 : User Assignable 3X Data Registers

| Address (Register) | Assignable Register | Modbus Start Address (Hex) | |
|---|---|---|---|
| | | High Byte | Low Byte |
| 30513 | Assignable Reg 1 | 02 | 00 |
| 30515 | Assignable Reg 2 | 02 | 02 |
| 30517 | Assignable Reg 3 | 02 | 04 |
| 30519 | Assignable Reg 4 | 02 | 06 |
| 30521 | Assignable Reg 5 | 02 | 08 |
| 30523 | Assignable Reg 6 | 02 | 0A |
| 30525 | Assignable Reg 7 | 02 | 0C |
| 30527 | Assignable Reg 8 | 02 | 0E |
| 30529 | Assignable Reg 9 | 02 | 10 |
| 30531 | Assignable Reg 10 | 02 | 12 |
| 30533 | Assignable Reg 11 | 02 | 14 |
| 30535 | Assignable Reg 12 | 02 | 16 |
| 30537 | Assignable Reg 13 | 02 | 18 |
| 30539 | Assignable Reg 14 | 02 | 1A |

## TABLE 16 : Continued...

| | | | |
|---|---|---|---|
| 30541 | Assignable Reg 15 | 02 | 1C |
| 30543 | Assignable Reg 16 | 02 | 1E |
| 30545 | Assignable Reg 17 | 02 | 20 |
| 30547 | Assignable Reg 18 | 02 | 22 |
| 30549 | Assignable Reg 19 | 02 | 24 |
| 30551 | Assignable Reg 20 | 02 | 26 |

## TABLE 17 : User Assignable 4X Data Registers

| Address (Register) | Assignable Register | Modbus Start Address (Hex) | |
|---|---|---|---|
| | | High Byte | Low Byte |
| 47681 | Assignable Reg 1 | 1E | 00 |
| 47683 | Assignable Reg 2 | 1E | 02 |
| 47685 | Assignable Reg 3 | 1E | 04 |
| 47687 | Assignable Reg 4 | 1E | 06 |
| 47689 | Assignable Reg 5 | 1E | 08 |
| 47691 | Assignable Reg 6 | 1E | 0A |
| 47693 | Assignable Reg 7 | 1E | 0C |
| 47695 | Assignable Reg 8 | 1E | 0E |
| 47697 | Assignable Reg 9 | 1E | 10 |
| 47699 | Assignable Reg 10 | 1E | 12 |
| 47701 | Assignable Reg 11 | 1E | 14 |
| 47703 | Assignable Reg 12 | 1E | 16 |
| 47705 | Assignable Reg 13 | 1E | 18 |
| 47707 | Assignable Reg 14 | 1E | 1A |
| 47709 | Assignable Reg 15 | 1E | 1C |
| 47711 | Assignable Reg 16 | 1E | 1E |
| 47713 | Assignable Reg 17 | 1E | 20 |

## TABLE 17 : Continued...

| Address (Register) | Assignable Register | Modbus Start Address (Hex) | |
|---|---|---|---|
| | | High Byte | Low Byte |
| 47715 | Assignable Reg 18 | 1E | 22 |
| 47717 | Assignable Reg 19 | 1E | 24 |
| 47719 | Assignable Reg 20 | 1E | 26 |

## TABLE 18 : User Assignable mapping register ( 4X registers)

| Address (Register) | Mapping Register | Modbus Start Address (Hex) | |
|---|---|---|---|
| | | High Byte | Low Byte |
| 40513 | Mapped Add for register #0x0200 | 02 | 00 |
| 40514 | Mapped Add for register #0x0202 | 02 | 01 |
| 40515 | Mapped Add for register #0x0204 | 02 | 02 |
| 40516 | Mapped Add for register #0x0206 | 02 | 03 |
| 40517 | Mapped Add for register #0x0208 | 02 | 04 |
| 40518 | Mapped Add for register #0x020A | 02 | 05 |
| 40519 | Mapped Add for register #0x020C | 02 | 06 |
| 40520 | Mapped Add for register #0x020E | 02 | 07 |
| 40521 | Mapped Add for register #0x0210 | 02 | 08 |
| 40522 | Mapped Add for register #0x0212 | 02 | 09 |
| 40523 | Mapped Add for register #0x0214 | 02 | 0A |
| 40524 | Mapped Add for register #0x0216 | 02 | 0B |
| 40525 | Mapped Add for register #0x0218 | 02 | 0C |
| 40526 | Mapped Add for register #0x021A | 02 | 0D |
| 40527 | Mapped Add for register #0x021C | 02 | 0E |
| 40528 | Mapped Add for register #0x021E | 02 | 0F |
| 40529 | Mapped Add for register #0x0220 | 02 | 10 |
| 40530 | Mapped Add for register #0x0222 | 02 | 11 |
| 40531 | Mapped Add for register #0x0224 | 02 | 12 |
| 40532 | Mapped Add for register #0x0226 | 02 | 13 |

**Assigning parameter to User Assignable Registers**

To access the Current (3X address 0x0002) and Power (3X address 0x0004) through user assignable register assign these addresses to 4x register (**TABLE 18**) 0x0200 and 0x0201 respectively.

**Assigning Query**:

| | |
|---|---|
| Device Address | 01 (Hex) |
| Function Code | 10 (Hex) |
| Starting Address Hi | 02 (Hex) |
| Starting Address Lo | 00 (Hex) |
| Number of Registers Hi | 00 (Hex)* |
| Number of Registers Lo | 02(Hex)* |
| Byte Count | 04 (Hex) |
| Data Register-1High Byte | 00 (Hex) |
| Data Register-1 Low Byte | 02 (Hex) |
| Data Register-2 High Byte | 00 (Hex) |
| Data Register-2 Low Byte | 04 (Hex) |
| CRC Low | CA (Hex) |
| CRC High | CB (Hex) |

Current (3X Address 0x0002)

Power (3X Address 0x0004)

* Note : Parameters should be assigned in Multiple of two i.e. 2,4,6,8.....20.

Response :

| | |
|---|---|
| Device Address | 01 (Hex) |
| Function Code | 10 (Hex) |
| Start Address High | 02 (Hex) |
| Start Address Low | 00 (Hex) |
| Number of Registers Hi | 00 (Hex) |
| Number of Registers Lo | 02 (Hex) |
| CRC Low | 40 (Hex) |
| CRC High | 70 (Hex) |

**Reading Parameter data through User Assignable Registers:**

In assigning query Current & Power parameters were assigned to 0x 200 & 0x201 (**TABLE 18)** which will point to user assignable 3x registers 0x200 and 0x202 (**TABLE 16**). So to read Current and Power data reading query should be as below.

**Query**:

| | |
|---|---|
| Device Address | 01 (Hex) |
| Function Code | 04 (Hex) |
| Start Address High | 02 (Hex) |
| Start Address Low | 00 (Hex) |
| Number of Registers Hi | 00 (Hex) |
| Number of Registers Lo | 04 (Hex)** |
| CRC Low | F0 (Hex) |
| CRC High | 71 (Hex) |

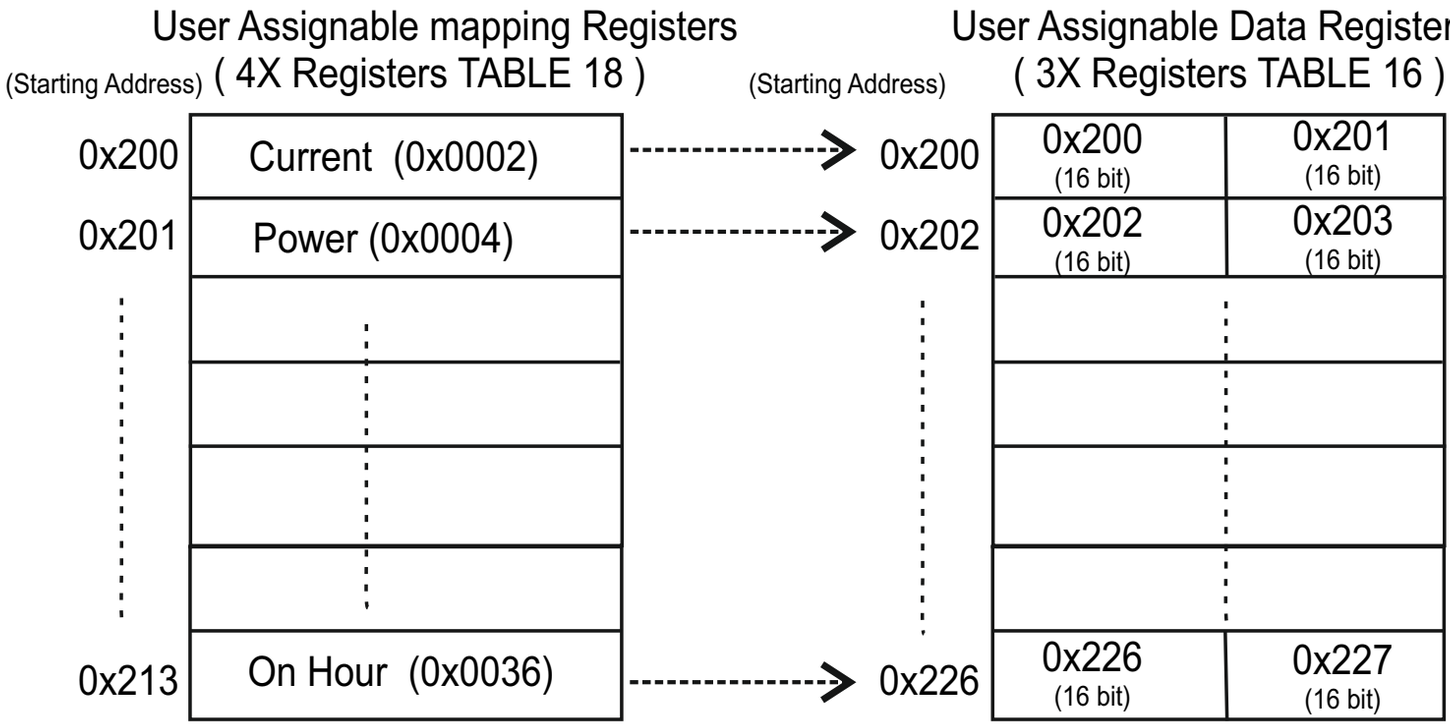
Start Address High : Most significant 8 bits of starting address of User assignable register.
Start Address low :Least significant 8 bits of starting address of User assignable register.

Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.

****Note : Two consecutive 16 bit register represent one parameter.**
**Since two parameters are requested four registers are required**

**Response :** (Current = 1.2A / Power = 1.0 W)

| | | |
|---|---|---|
| Device Address | 01 (Hex) | |
| Function Code | 04 (Hex) | |
| Byte count | 08 (Hex) | |
| Data Register-1High Byte | 3F (Hex) | **Current** |
| Data Register-1 Low Byte | 99 (Hex) | |
| Data Register-2 High Byte | 99 (Hex) | |
| Data Register-2 Low Byte | 9A (Hex) | |
| Data Register-3 High Byte | 3F (Hex) | **Power** |
| Data Register-3 Low Byte | 80 (Hex) | |
| Data Register-4 High Byte | 00 (Hex) | |
| Data Register-4 Low Byte | 00 (Hex) | |
| CRC Low | 79 (Hex) | |
| CRC High | 3F (Hex) | |




**To get the data through User Assignable Register go through the following steps:**

1) Assign starting addresses(**TABLE 1**) of parameters of interest to "User assignable mapping registers" in a sequence in which they are to be accessed (see section "**Assigning Parameter to User Assignable Registers"**).
2) Once the parameters are mapped, data can be acquired by using "User assignable data register" Starting address i.e. to access data of Current, Power & On Hour send query with starting address 0x200 with number of register 8 or individually parameters can be accessed.

(See section **Reading Parameter data through User Assignable Registers).**

# 4. Datalogging

Datalogging is a feature that allows the meter to store measured parameters based on time or on occurrence of a certain event. The user can retrieve the data later for further application.
This meter offers three types of datalogging
1) Event based
2) Time based
3) Load profile

## 4.1 Event Based Datalogging

This type of datalogging stores data when certain event is observed. This data is time stamped and last five occurrences of each type of event are stored based on first in first out queue. This meter offers event based logging for 8 parameters. This data can be observed on the modbus on the address table shown below. These registers can be accessed by the query explained in section 3.1 The user can turn this logging on and off through display as well as modbus by using address 40365.
Changing any setup parameter related to the logged parameters will reset the log.

**Table 19: 3X addresses for event based datalog**

| Address | Logged Parameter | Log Details | Mod Start Address Hex | |
|---|---|---|---|---|
| | | | High Byte | Low Byte |
| 312289 | Max Voltage | Date 1 | 30 | 00 |
| 312291 | | Time 1 | 30 | 02 |
| 312293 | | Value 1 | 30 | 04 |
| 312295 | | Date 2 | 30 | 06 |
| 312297 | | Time 2 | 30 | 08 |
| 312299 | | Value 2 | 30 | 0A |
| 312301 | | Date 3 | 30 | 0C |
| 312303 | | Time 3 | 30 | 0E |
| 312305 | | Value 3 | 30 | 10 |
| 312307 | | Date 4 | 30 | 12 |
| 312309 | | Time 4 | 30 | 14 |
| 312311 | | Value 4 | 30 | 16 |
| 312313 | | Date 5 | 30 | 18 |
| 312315 | | Time 5 | 30 | 1A |
| 312317 | | Value 5 | 30 | 1C |

| Address | Logged Parameter | Log Details | Mod Start Address Hex | |
|---|---|---|---|---|
| | | | High Byte | Low Byte |
| 312319 | Min Voltage | Date 1 | 30 | 1E |
| 312321 | | Time 1 | 30 | 20 |
| 312323 | | Value 1 | 30 | 22 |
| 312325 | | Date 2 | 30 | 24 |
| 312327 | | Time 2 | 30 | 26 |
| 312329 | | Value 2 | 30 | 28 |
| 312331 | | Date 3 | 30 | 2A |
| 312333 | | Time 3 | 30 | 2C |
| 312335 | | Value 3 | 30 | 2E |
| 312337 | | Date 4 | 30 | 30 |
| 312339 | | Time 4 | 30 | 32 |
| 312341 | | Value 4 | 30 | 34 |
| 312343 | | Date 5 | 30 | 36 |
| 312345 | | Time 5 | 30 | 38 |
| 312347 | | Value 5 | 30 | 3A |

**Table 19: Continued..**

| | | | | |
|---|---|---|---|---|
| 312349 | Max Current | Date 1 | 30 | 3C |
| 312351 | | Time 1 | 30 | 3E |
| 312353 | | Value 1 | 30 | 40 |
| 312355 | | Date 2 | 30 | 42 |
| 312357 | | Time 2 | 30 | 44 |
| 312359 | | Value 2 | 30 | 46 |
| 312361 | | Date 3 | 30 | 48 |
| 312363 | | Time 3 | 30 | 4A |
| 312365 | | Value 3 | 30 | 4C |
| 312367 | | Date 4 | 30 | 4E |
| 312369 | | Time 4 | 30 | 50 |
| 312371 | | Value 4 | 30 | 52 |
| 312373 | | Date 5 | 30 | 54 |
| 312375 | | Time 5 | 30 | 56 |
| 312377 | | Value 5 | 30 | 58 |
| 312469 | Min Current | Date 1 | 30 | B4 |
| 312471 | | Time 1 | 30 | B6 |
| 312473 | | Value 1 | 30 | B8 |
| 312475 | | Date 2 | 30 | BA |
| 312477 | | Time 2 | 30 | BC |
| 312479 | | Value 2 | 30 | BE |
| 312481 | | Date 3 | 30 | C0 |
| 312483 | | Time 3 | 30 | C2 |
| 312485 | | Value 3 | 30 | C4 |
| 312487 | | Date 4 | 30 | C6 |
| 312489 | | Time 4 | 30 | C8 |
| 312491 | | Value 4 | 30 | CA |
| 312493 | | Date 5 | 30 | CC |
| 312495 | | Time 5 | 30 | CE |
| 312497 | | Value 5 | 30 | D0 |

| | | | | |
|---|---|---|---|---|
| 312589 | Max Import Power Demand | Date 1 | 31 | 2C |
| 312591 | | Time 1 | 31 | 2E |
| 312593 | | Value 1 | 31 | 30 |
| 312595 | | Date 2 | 31 | 32 |
| 312597 | | Time 2 | 31 | 34 |
| 312599 | | Value 2 | 31 | 36 |
| 312601 | | Date 3 | 31 | 38 |
| 312603 | | Time 3 | 31 | 3A |
| 312605 | | Value 3 | 31 | 3C |
| 312607 | | Date 4 | 31 | 3E |
| 312609 | | Time 4 | 31 | 40 |
| 312611 | | Value 4 | 31 | 42 |
| 312613 | | Date 5 | 31 | 44 |
| 312615 | | Time 5 | 31 | 46 |
| 312617 | | Value 5 | 31 | 48 |
| 312709 | Max Export Power Demand | Date 1 | 31 | A4 |
| 312711 | | Time 1 | 31 | A6 |
| 312713 | | Value 1 | 31 | A8 |
| 312715 | | Date 2 | 31 | AA |
| 312717 | | Time 2 | 31 | AC |
| 312719 | | Value 2 | 31 | AE |
| 312721 | | Date 3 | 31 | B0 |
| 312723 | | Time 3 | 31 | B2 |
| 312725 | | Value 3 | 31 | B4 |
| 312727 | | Date 4 | 31 | B6 |
| 312729 | | Time 4 | 31 | B8 |
| 312731 | | Value 4 | 31 | BA |
| 312733 | | Date 5 | 31 | BC |
| 312735 | | Time 5 | 31 | BE |
| 312737 | | Value 5 | 31 | C0 |

**Table 19: Continued..**

| | | | | |
|---|---|---|---|---|
| 312829 | Max Import Current Demand | Date 1 | 32 | 1C |
| 312831 | | Time 1 | 32 | 1E |
| 312833 | | Value 1 | 32 | 20 |
| 312835 | | Date 2 | 32 | 22 |
| 312837 | | Time 2 | 32 | 24 |
| 312839 | | Value 2 | 32 | 26 |
| 312841 | | Date 3 | 32 | 28 |
| 312843 | | Time 3 | 32 | 2A |
| 312845 | | Value 3 | 32 | 2C |
| 312847 | | Date 4 | 32 | 2E |
| 312849 | | Time 4 | 32 | 30 |
| 312851 | | Value 4 | 32 | 32 |
| 312853 | | Date 5 | 32 | 34 |
| 312855 | | Time 5 | 32 | 36 |
| 312857 | | Value 5 | 32 | 38 |

| | | | | |
|---|---|---|---|---|
| 312949 | Max Export Current Demand | Date 1 | 32 | 94 |
| 312951 | | Time 1 | 32 | 96 |
| 312953 | | Value 1 | 32 | 98 |
| 312955 | | Date 2 | 32 | 9A |
| 312957 | | Time 2 | 32 | 9C |
| 312959 | | Value 2 | 32 | 9E |
| 312961 | | Date 3 | 32 | A0 |
| 312963 | | Time 3 | 32 | A2 |
| 312965 | | Value 3 | 32 | A4 |
| 312967 | | Date 4 | 32 | A6 |
| 312969 | | Time 4 | 32 | A8 |
| 312971 | | Value 4 | 32 | AA |
| 312973 | | Date 5 | 32 | AC |
| 312975 | | Time 5 | 32 | AE |
| 312977 | | Value 5 | 32 | B0 |

## 4.2 Time Based Datalogging

This type of datalogging stores data with a timestamp at a preset time interval. This can be used to take a snapshot of the system at regular time intervals. This data can be used to do in-depth analysis of the system. The number of parameters to be logged and which parameters to store can also be configured by the user through display as well as modbus. Configuration registers can be found on address 40367.
The number of entries stored varies according to the number of parameters logged i.e. more entries can be stored if less number of parameters are being logged. User can configure the meter to store 1 to 30 parameters. And the time interval can vary from 1 to 60 minutes. Editing of these parameters is not allowed while the logging is on.
Each entry consists of number of parameters selected by the user in addition to date and time of the entry log.

Max Memory Locations = 273030
Actual parameters stored in each Entry = Date + Time + User Selected Parameters
Actual parameters count = 1 + 1 + Time Log Parameter Count
Max Entries that can be stored = Max Memory Locations / (Parameter Count + 2)
= 273030 / (Parameter Count + 2)

For example,
Parameter count = 1
Max Entries = 273030 / (1+2)
= 91010

Parameter count = 30
Max Entries = 273030 / (30+2)
= 8532

Interval Setting (min) = 1
Entries in 1 day = (60 / Interval Setting) x 24
= (60 / 1) x 24= 1440

Max Days = Max Entries / Entries in 1 day
= 8532 / 1440
= 5.92 days

After all memory allocated locations are filled with logging data, the meter will start shifting data by first in first out queue i.e. at any time after all the locations are used once, the user will have access to the latest logged maximum number of entries.

## Query Format for Downloading the Time based datalog

The query format for downloading an entry of a time datalog is given below. Maximum number of register the user can access in 1 query are limited by 80 and corresponding to itmaximum byte count is 160. The byte count should be logging parameter count multiplied by 4 and added to 8, where 8 is the byte count for date and time (4 bytes x 2 parameters).

(logging parameter count x 4) + (2 x 4)

e.g.
if logging parameter count is 10

byte count = (10 x 4) + 8 = 48 (4 bytes per parameter)

number of registers = (10 x 2) + (2 x 2) = 24 (2 registers per parameter)

Starting address will be 01,CA for time datalog.
The entry number of the desired log need to be converted to IEEE format and sent as 4 bytes.

### Query example:

| Description | Decimal Value | Hex Value |
|---|---|---|
| Dev Addr | 3 | 03 |
| Func Code | 16 | 10 |
| Start Addr Hi | | 01 |
| Start Addr Lo | | CA |
| No of Reg Hi | 00 | 00 |
| No of Reg Lo | 14 | 0E |
| Log Download Bytes | 28 | 1C |
| Entry No Reg 1 Hi | 25 | 41 |
| Entry No Reg 1 Lo | | C8 |
| Entry No Reg 2 Hi | | 00 |
| Entry No Reg 2 Lo | | 00 |
| CRC Lo | | CC |
| CRC Hi | | A4 |

If a user wants to download 5 parameters logged at entry number 25, the query will be as following (Assuming device address 3). All the data in query is represented in hexadecimal float.

**03,10, 01, CA,00,0E,1C,41,C8,00,00,CC,A4**

03 is device address;
10 is function code;
01 CA is the address that lets the user access the time datalog;
00 0E is number of registers to be accessed (actual parameter count x 2);
1C is number of bytes to be accessed;
41 C8 00 00 is entry number converted to hex;
CC A4 is CRC calculated on query.

**Response:**

| Description | Hex Value | Decimal Value |
|---|---|---|
| Dev Addr | 03 | 03 |
| Func Code | 10 | 16 |
| No of bytes | 1C | 28 |
| Date | 46,24,28,00 | 010506(May 1st 2006) |
| Time | 40,CC,CC,CD | 6.40 (06:40 am) |
| Parameter 1 | 41,78,1F,68 | 15.50 |
| Parameter 2 | 46,AB,5A,12 | 21933.0 |
| Parameter 3 | 46,AC,57,6A | 22059.7 |
| Parameter 4 | 46,AB,3C,58 | 21918.2 |
| Parameter 5 | 46,A9,AD,9D | 21718.8 |
| CRC | BE,7C | |

The response to time datalog query contains data in following structure.
First two bytes are device address and function code, followed by number of bytes data of 1 byte and then date and a time data of 4 bytes each.
Then requested parameters are received in order that is specified in timelog parameters settings, each of 4 bytes.
The response ends with 2 bytes of CRC.

## 4.3 Load Profile Datalogging

This type of datalogging stores data on each day at time 00:00. The parameters stored in this log include energy, maximum power demand and maximum current demand. This log stores data daily as well as monthly interval. Hence, daily and monthly energy consumption can be logged. Furthermore, maximum power demand and maximum current demand in during each day and each month is also logged.. This data can be used to study load behaviour over a period of time.

The daily data available to the user is maximum of one year interval and the monthly data for 14 years interval assuming the log requested is after the starting date (requesting data before the starting date will result in modbus exception message). 1 year after the starting date, the oldest logs of daily data are constantly replaced with latest logs. 14 years after the starting date, all the load profile logs is cleared and logging is started again.

This log can be selected or de-selected i.e. if it is selected to be load profile logged; energy, maximum power demand and maximum current demand will be logged. The starting date of this datalog is stored in read only memory location 40435.

The user can access different parameters in this log this log by sending queries using following addresses.

**Note: Changing the meter date resets the load profile log.**

**Table 20: Addresses for Load Profile datalog access**

| Parameter | Modbus Start Address Hex | |
|---|---|---|
| | High Byte | Low Byte |
| Daily Energy Datalog Download Addr | 01 | CC |
| Daily Maximum Power Demand Datalog Download Addr | 01 | CE |
| Daily Maximum Current Demand Datalog Download Addr | 01 | D0 |
| Monthly Energy Datalog Download Addr | 01 | D2 |
| Monthly Maximum Power Demand Datalog Download Addr | 01 | D4 |
| Monthly Maximum Current Demand Datalog Download Addr | 01 | D6 |

**Table 21: Parameter number for Load Profile**

| Para No. | Description |
|---|---|
| 1 | Import |
| 2 | Export |

## Query Format for Downloading the Load Profile Datalog

The query format for downloading an entry of a daily load profile log is given below. Maximum number of register the user can access in 1 query are limited by 80.

**Query example:**

| Description | Decimal Value | Hex Value |
|---|---|---|
| Dev Addr | 03 | 03 |
| Func Code | 16 | 10 |
| Start Addr Hi | | 01 |
| Start Addr Lo | | CC |
| No of Reg Hi | 00 | 00 |
| No of Reg Lo | 20 | 14 |
| Log Download Bytes | 40 | 28 |
| Parameter no | 01 | 01 |
| Date | 04 | 04 |
| Month | 11 | 0B |
| Year | 14 | 0E |
| CRC Lo | | AD |
| CRC Hi | | C3 |

**Example:** If a user wants to access daily energy load profile log of for 10 days from 4 November 2014 to 13 November 2014, the query for this will be as following.

**03,10,01,CC,00,14,28,01,04,0B,0E,AD,C3**

03 is device address;
10 is function code;
01 CC is the starting address for accessing the daily energy load profile log. (refer table 20)
00 14 is the number of registers to be accessed. This value will be double of the number of parameters requested.
28 is the number of bytes requested in this query. This value will be 4 times the number of parameters requested.
01 is the parameter number for import data. (refer Table 21)
04 0B 0E is the starting date of the log to be accessed.
AD C3 is the CRC added at the end.

The load profile datalog access query consists of device address and function code followed by the starting address which is different for different parameters and mentioned in Table 20. Number of registers can vary in multiple of 2, but can not exceed 80 and corresponding to it, number of bytes can not exceed 160.
Parameter number decides the parameter within the log (Refer Table 21).
Date, month and year decides the date from which the data is to be downloaded.
All data in the query is represented in hexadecimal format.
At the end 2 byte CRC is calculated.

**Response:**

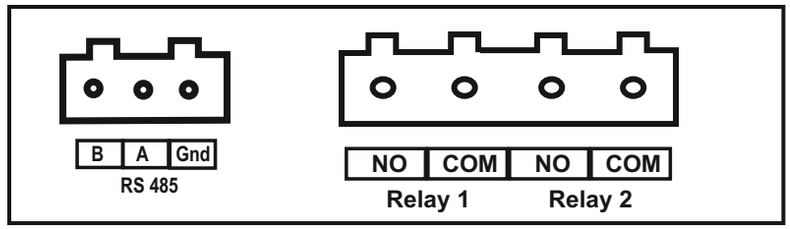
| Description | Hex | Decimal |
|---|---|---|
| Dev Addr | 03 | 03 |
| Func Code | 10 | 16 |
| Number of bytes | 28 | 40 |
| Value 1 (Nov 4) | 48,6A,B4,80 | 240338 |
| Value 2 (Nov 5) | 48,6A,AD,40 | 240309 |
| Value 3 (Nov 6) | 48,6A,AA,C0 | 240299 |
| Value 4 (Nov 7) | 48,6A,B6,40 | 240345 |
| Value 5 (Nov 8) | 48,6A,B1,40 | 240325 |
| Value 6 (Nov 9) | 48,6A,B4,80 | 240338 |
| Value 7 (Nov 10) | 48,6A,B7,40 | 240349 |
| Value 8 (Nov 11) | 48,6A,AF,C0 | 240319 |
| Value 9 (Nov 12) | 48,6A,B3,40 | 240333 |
| Value 10 (Nov 13) | 48,6A,BD,C0 | 240375 |
| CRC | A9,2A | |

The response to the load profile query contains device address, function code and number of bytes data each of 1 byte, and then the requested parameters of 4 bytes each. Each parameter represents data over a period of a day when daily log is accessed and represents data over a period of a month when monthly log is accessed.
The response ends with 2 byte CRC.

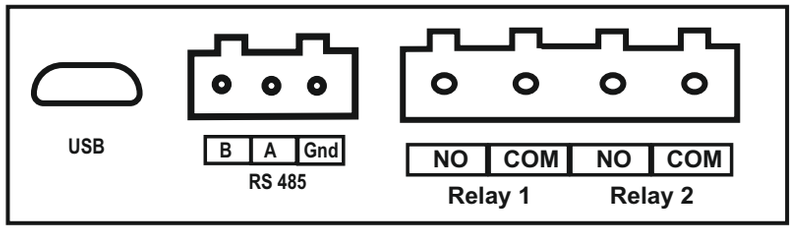
**Note:** If a user tries to access the data which is out of the range of the datalog i.e. more than 1 year before the present date for daily log and more than 14 years before the present date for monthly log, it will result in a modbus exception. The same will occur if a user tries to access the data before the starting date of the Load Profile log or a future date.

# 5. Connection for Optional Pulse Output / RS 485 (rear view of Multifunction Meter):

## 1. RS 485 Output with Relay1 & Relay2




## 2. USB and RS 485 Output with Relay1 & Relay2



**NOTE**

The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, ‘manufacturer’ has no control over the field conditions which influence product installation.

It is the user’s responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are those in ‘manufacturer’ standard Conditions of Sale for this product and in no case will ‘manufacturer’ be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products.